Environmental Releases for Calendar Year 1997

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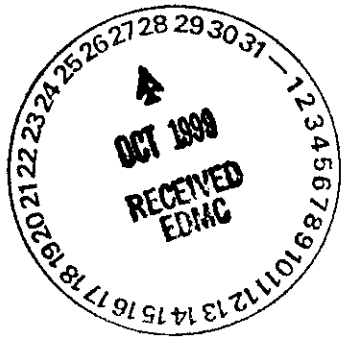

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Assistant Secretary for Environmental Management

FLUOR DANIEL HANFORD, INC.
Richland, Washington

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EXECUTIVE SUMMARY

This report fulfills the annual environmental release reporting requirements of U.S. Department of Energy (DOE) Order 5400.1. This report provides supplemental information to the Hanford Site Environmental Report (PNNL-11795). The Hanford Site Environmental Report provides an update on the environmental status of the Hanford Site. The sitewide annual report summarizes the degree of compliance with applicable environmental regulations and informs the public concerning the impact of Hanford Site operations on the surrounding environment.

Like the Hanford Site Environmental Report, this annual report presents a summary of the environmental releases from facilities and activities managed by the Fluor Daniel Hanford, Incorporated (FDH), and Bechtel Hanford, Incorporated (BHI). In addition to the summary data, this report also includes detailed data on air emissions, liquid effluents, and hazardous substances released to the environment during calendar year 1997.

Comprehensive data summaries of air emissions and liquid effluents in 1997 are displayed in Tables ES-1 through ES-5. These tables represent the following:

- **Table ES-1.** Radionuclide air emissions data (detailed data on emissions are presented in Section 2.0)
- **Table ES-2.** Data on radioactive liquid effluents discharged to the soil (detailed data are presented in Section 3.0)
- **Table ES-3.** Radionuclides discharged to the Columbia River (detailed data are presented in Section 3.0)
- **Table ES-4.** Nonradioactive air emissions data (detailed data are presented in Section 2.0)
- **Table ES-5.** Total Volumes and Flow Rates of 200/600 Area Radioactive Liquid Effluents (detailed data are presented in Section 3.0).

Table ES-1

Release Estimates of 1997 Radionuclide Air Emissions from FDH and BHI Facilities.	
Radionuclide	Release (Ci)[a]
^{3}H (HTO)[b]	8.1 E+00
^{3}H (HT)[b]	5.5 E-01
^{60}Co	8.3 E-10
^{90}Sr	5.7 E-04
^{106}Ru	ND
^{113}Sn	ND
^{125}Sb	3.7 E-09
^{129}I	1.4 E-03
^{134}Cs	ND
^{137}Cs	9.7 E-04
^{152}Eu	ND
^{154}Eu	ND
^{155}Eu	ND
^{238}Pu	3.0 E-06
$^{239,240}Pu$	1.2 E-04
^{241}Pu	9.2 E-05
^{241}Am	2.7 E-05

Notes:

a 1 curie = 3.7 E+10 becquerel; ND = not detected (i.e., either the radionuclide was not detected in any sample during the year, or the average of all the measurements for that given radionuclide or type of radioactivity made during the year was below background levels).

b HTO - tritiated water, HT - tritium gas.

Table ES-2

Release Estimates of 1997 Radioactive Liquid Effluents Discharged to Soil from FDH and BHI Facilities

Radionuclide	Release (Ci)[a]
^{3}H	2.5 E+01
^{14}C	2.2 E-05
^{90}Sr	1.5 E-04
^{99}Tc	4.2 E-05
^{106}Ru	ND
^{113}Sn	ND
^{125}Sb	ND
^{129}I	1.3 E-04
^{134}Cs	ND
^{137}Cs	4.6 E-04
^{226}Ra	5.5 E-05
^{234}U	2.3 E-04
^{235}U	1.9 E-05
^{238}U	1.7 E-04
^{237}Np	1.8 E-06
^{238}Pu	7.4 E-05
$^{239,240}Pu$	7.0 E-05
^{241}Am	1.8 E-04

Note:

a 1 curie = 3.7 E+10 becquerel; ND = not detected (i.e., either the radionuclide was not detected in any sample during the year, or the average of all the measurements for that given radionuclide or type of radioactivity made during the year was below background levels).

Table ES-3

Release Estimates of 1997 Radionuclides in Liquid Effluents Discharged to the Columbia River from FDH and BH1 Facilities.

Radionuclide	Release (Ci)[a]
^{3}H	1.3 E-01
^{60}Co	ND
^{90}Sr	1.3 E-01
^{106}Ru	ND
^{125}Sb	ND
^{134}Cs	ND
^{137}Cs	ND
^{154}Eu	ND
^{155}Eu	ND
^{238}Pu	ND
$^{239/240}Pu$	ND
^{241}Am	5.9 E-07

Note:

a 1 curie = 3.7 E+10 becquerel; ND = not detected (i.e., either the radionuclide was not detected in any sample during the year, or the average of all the measurements for that given radionuclide or type of radioactivity made during the year was below background levels).

Table ES-4

Release Estimates of 1997 Nonradioactive Constituents in Air Emissions from FDH and BHI Facilities.	
Constituent	**Quantities (kg)**
Particulates	1.21 E+04
Sulfur oxides (SO_x)	2.16 E+05
Nitrogen oxides (NO_x)	3.79 E+05
Carbon monoxide (CO)	5.69 E+04
Lead	1.61 E+02
Volatile organic compounds	1.53 E+03
Ammonia	6.39 E+03
Arsenic	1.62 E+02
Beryllium	2.07 E+01
Cadmium	3.42 E+01
Carbon tetrachloride	2.27 E-01
Chromium	4.48 E+02
Cobalt	1.28 E+01
Copper	3.03 E+02
Formaldehyde	1.05 E+02
Manganese	6.08 E+02
Mercury	7.82 E+00
Nickel	6.03 E+02
Polycyclic organic matter	6.23 E+03
Selenium	5.83 E+01
Vanadium	3.57 E+02

Table ES-5

Total Volumes and Flow Rates of Radioactive Liquid Effluents Discharged to the 200 and 600 Area Disposal Sites during 1996 and 1997 from FDH and BHI Facilities[a]

Stream code[b]	EDP code	Effluent source	Disposal site	Volume (L)		Average flow rate[c] (gpm)	
				1996	1997	1996	1997
ACW	H108	242-A Evaporator cooling water	216-B-3 Pond	2.2 E+09	7.0 E+08	8,220	653
ASC	H110	242-A Evaporator steam condensate	216-B-3 Pond	8.4 E+06	3.2 E+06	12	23
CA8	H115	241-A Tank Farm cooling water	216-B-3 Pond	8.6 E+08	5.4 E+08	432	431
CAR	H116	244-AR Vault cooling water	216-B-3 Pond	2.0 E+06	1.2 E+06	1	1
CBC	H117	B Plant cooling water	216-B-3 Pond	2.1 E+09	1.4 E+07	1,035	27
ETF	H129	200 Area Effluent Treatment Facility	616-A Crib	3.1 E+07	5.5 E+07	265	27

Notes:

a These discharges do not include discharges to the 200 East Area Treated Effluent Disposal Facility, because these discharges meet drinking water standards. Currently, BHI does not manage any facilities that discharge radioactive liquid effluents to the 200 and 600 Areas.

b Stream codes are alpha numeric designators for specific liquid effluent sources.

c Average flow rate for each discharge and/or sampling period, 1 gpm = 3.785 Lpm.

CONTENTS

LIST OF TABLES

GLOSSARY

BHI	Bechtel Hanford, Incorporated
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CFR	Code of Federal Regulations
DCG	derived concentration guide
DOE	U.S. Department of Energy
DOE-RL	U.S. Department of Energy, Richland Operations Office
Ecology	State of Washington Department of Ecology
EDE	effective dose equivalent
EDP Code	Electronic data processing code
EP	external publication
EPA	U.S. Environmental Protection Agency
ERDF	Environmental Restoration Disposal Facility
ESPC	energy savings performance contract
FDH	Fluor Daniel Hanford, Incorporated
FFTF	Fast Flux Test Facility
HEPA	high-efficiency particulate air (filter)
HT	tritium gas
HTO	tritiated water
LWDF	Liquid Waste Disposal Facility
MASF	Maintenance and Storage Facility
MEI	maximally exposed individual
mrem	millirem (unit of dose)
ND	not detected
NPDES	National Pollutant Discharge Elimination System
PHMC	Project Hanford Management Contract
PFP	Plutonium Finishing Plant
PSD	Prevention of Significant Deterioration
PNNL	Pacific Northwest National Laboratory
POTW	publicly owned treatment works (city of Richland)
ppm	parts per million
PUREX	plutonium-uranium extraction
RCRA	*Resource Conservation and Recovery Act of 1976*
REDOX	Reduction-Oxidation
RQ	reportable quantity
SALDS	State-Approved Land Disposal Site
TEDF	Treated Effluent Disposal Facility
TRIGA	Test Reactor and Isotope Production, General Atomics
TRU	transuranic (waste)
TRUSAF	224-T Transuranic Waste Storage and Assay Facility
UO_3	uranium trioxide

GLOSSARY (continued)

WAC	Washington Administrative Code
WESF	Waste Encapsulation Storage Facility
WDOH	State of Washington Department of Health
WMH	Waste Management Federal Services of Hanford, Incorporated
WSCF	Waste Sampling and Characterization Facility

ENVIRONMENTAL RELEASES FOR CALENDAR YEAR 1997

1.0 INTRODUCTION

Fluor Daniel Hanford, Incorporated (FDH) and Bechtel Hanford, Incorporated (BHI) are responsible for monitoring radioactive and nonradioactive material released into the environment from U.S. Department of Energy (DOE) facilities and activities managed by them, on the Hanford Site.

This report fulfills the annual environmental release reporting requirements of DOE Order 5400.1. This report provides supplemental information to the *Hanford Site Environmental Report for Calendar Year 1997* (PNNL-11795). The Hanford Site Environmental Report provides an update on the environmental status of the entire Hanford Site. The sitewide annual report summarizes the degree of compliance with applicable environmental regulations and informs the public concerning the impact of Hanford Site operations on the surrounding environment.

Like the Hanford Site Environmental Report, this annual report presents a summary of the environmental releases from facilities and activities. In addition to the summary data, this report also includes detailed data on air emissions, liquid effluents, and hazardous substances released to the environment from these facilities during calendar year 1997.

1.1 TYPES AND LOCATIONS OF RELEASES

Radioactive liquid effluents and air emissions are released from facilities in the 100, 200, 300, 400 and 600 Areas. Radioactive liquid effluents are discharged to the soil in the 200 and 600 Areas, and to the Columbia River at the 100 N and 100 K Areas.

The major potential sources of nonradioactive air emissions of industrial origin are (1) fossil-fuel combustion emissions from the operation of powerhouses, package boilers, and portable generators, (2) emissions of nitrogen oxides, ammonia, and volatile organic compounds from liquid radioactive waste tanks, 242-A Evaporator, 200 Area Effluent Treatment Facility, and (3) carbon tetrachloride emissions from the CCl_4 Vapor Extraction Project. The majority of these sources are located in the 200 and 300 Areas. In March 1997, the Department of Energy issued an Energy Savings Performance Contract (ESPC) to replace the Hanford Site's coal and oil fired boilers with smaller, cleaner operating, and more energy efficient diesel and natural gas fired boilers. In December 1997, operation of the 284-E and 284-W powerhouses ceased and 14 new diesel fired boilers came on line in the 200 Areas. In March 1998, operation of the 300 Area powerhouse ceased.

Waste water from water treatment facilities and powerhouses located in the 100 N and 200 Areas is discharged to the soil column. In the 300 Areas waste water is sent to the 300 Area TEDF for treatment and discharged to the Columbia River, via a permitted outfall.

The 100 N Sanitary Sewage Lagoon receives sanitary waste water from the 100 N facilities and from failed septic systems, via tanker truck. 100 B, 100 D, 100 H, and 100 K Areas discharge sanitary waste water into septic-tanks or drain-fields. Sanitary waste water is discharged to several septic-tank or subsurface disposal systems in the 200 Areas. Historically, sanitary waste water from the 300 and 400 Areas was discharged to a septic-tank trench system in the 300 Area and the sewage treatment plant and lagoon in the 400 Area. Sanitary waste water from the 300 Area is presently discharged to the city of Richland's publicly owned treatment works (POTW). In April of 1997, 400 Area sanitary waste water discharges started going to the Washington Public Power Supply's sewage treatment plant.

On March 29, 1996, the Solid Waste Landfill was closed. Leachate from the closed Solid Waste Landfill is collected, transported, and treated at the 300 Area TEDF. Since December 29, 1995, nonradioactive nonhazardous waste has been disposed at the city of Richland Landfill, which is adjacent to the southern edge of the Hanford Site boundary. Since February 1996, medical waste has been shipped to Waste Management of Kennewick for landfill disposal; asbestos has been shipped to Basin Disposal, Inc., in Pasco, and the Environmental Restoration Disposal Facility (ERDF), located on the Hanford Site, for landfill disposal. Since March of 1996, nonregulated containerized waste has been shipped to Waste Management of Kennewick.

1.2 ENVIRONMENTAL RELEASE LIMITS AND GUIDELINES

This section presents environmental release standards for radiological constituents. Relevant standards for nonradioactive constituents also are included in this section. Guidelines are applicable for constituents when the constituents: (1) affect the release and transport of radioactive constituents, (2) are necessary to meet any issued federal, state, or local permit, or (3) are necessary to meet any federal, state, or local regulations or guidelines prescribed by the U.S. Department of Energy, Richland Operations Office (DOE-RL).

1.2.1 Limits for Radioactive Releases

Quantities of radionuclides in air emissions and liquid effluents from Hanford Site facilities are governed by DOE Order 5400.5, *Radiation Protection of the Public and the Environment*. Quantities of radionuclides in air emissions are regulated by Title 40 of the Code of Federal Regulations (CFR) Part 61, Subpart H and the Washington Administrative Code (WAC) Chapter 246-247. The effective dose equivalent (EDE) received by any member of the offsite public from all effluents and emissions released during routine operations on the Hanford Site is not to exceed 100 mrem/yr (1 mSv/yr) from continuous exposure throughout a prolonged

period (5 years) and 500 mrem/yr (5 mSv/yr) from noncontinuous, occasional exposure. From the air pathway only, the EDE to any member of the public is not to exceed 10 mrem/yr (0.1 mSv/yr).

The derived concentration guide (DCG) values in DOE Order 5400.5 apply at the location of actual exposure to members of the public. DCG values are not limits; these values are used for comparison purposes only.

The 300 Area TEDF is also regulated by an aquatic lands sewer outfall lease, Lease Number 20-012257, from the U.S. Department of Natural Resources. Limits for radioactive constituents include: 15 pCi/L (5.5 E-04 Bq/m^3) alpha, 50 pCi/L (1.9 E+03 Bq/m^3) beta, and 20,000 pCi/L (7.4 E+05 Bq/m^3) tritium.

Pacific Northwest National Laboratory (PNNL) issues the annual environmental summary report for the Hanford Site (PNNL-11795) as required by DOE Order 5400.1. This report assesses the radiological impact to the public resulting from all Hanford Site operations, in accordance with DOE Order 5400.5 and DOE Order 5480.1B. The PNNL report uses the release data contained in this report and the *Radionuclide Air Emissions Report for the Hanford Site Calendar Year 1997* (DOE/RL-98-33) to calculate the offsite radiological dose impact. The PNNL report summarizes the information used to verify compliance with the dose standards specified in DOE Order 5400.5.

1.2.2 Limits for Nonradioactive Releases

The *Clean Water Act of 1977, Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, Resource Conservation and Recovery Act (RCRA) of 1976, Safe Drinking Water Act of 1974, Toxic Substances Control Act of 1976*, and the State of Washington's regulations WAC 173-216, WAC 173-218, WAC 173-272, and WAC 173-303 also regulate nonradioactive constituents in air emissions and/or liquid effluents.

Liquid effluent streams discharging to the Columbia River are regulated by the National Pollutant Discharge Elimination System. Limits for specific constituents are specified in the permit issued by the U.S. Environmental Protection Agency (EPA).

Liquid effluent discharges to the soil column are permitted by the State of Washington Departments of Ecology (Ecology) and Health (WDOH), with the exception of storm water discharges. Limits for specific constituents are specified for each of the discharge permits issued by Ecology and WDOH. A permit application for storm water discharges to the soil column has been submitted, but a permit has not been issued.

2.0 AIR EMISSIONS

Both radioactive and nonradioactive air emissions have been released to the atmosphere from facilities and activities managed by FDH and BHI. Release data for each type of emission are discussed separately.

2.1 RADIONUCLIDE AIR EMISSIONS

Radionuclide air emissions from actively ventilated point sources, with a potential to emit radioactive material to the atmosphere, are routinely monitored. Air emissions from actively ventilated point sources are usually discharged from stacks or vents. In the 200 Areas, stacks and vents are designated by a number that has a "291" or "296" prefix, depending on height: 61 m (200 ft) tall are designated by a "291" prefix; all other stacks and vents are designated by the "296" prefix. In the 100, 300, and 400 Areas, stacks and vents usually are identified by facility designations.

Radionuclide air emissions from sources other than actively ventilated point sources are monitored as diffuse and fugitive emissions. These sources are monitored collectively by the Near-Facility Monitoring Program and the Environmental Surveillance Program. Monitoring data from these sources is not presented in this report but can be obtained from the *Radionuclide Air Emission Report for the Hanford Site Calendar Year 1997* (DOE/RL-98-33), the *Hanford Site Near-Facility Environmental Monitoring Annual Report Calendar Year 1997* (HNF-EP-0573-6), the *Hanford Site Environmental Monitoring Report for Calendar Year 1997* (PNNL-11795), and *1997 Surface Environmental Surveillance Data* (PNNL-11796).

2.1.1 Mitigation of Radionuclide Air Emissions

The following are examples of methods used to remove radionuclides from air emissions: (1) high-efficiency particulate air (HEPA) filters, (2) sand filters, (3) charcoal absorbers (for iodine removal), (4) water scrubbers, (5) deep-bed fiberglass filters, and (6) fiberglass prefilters. Generally at least one stage, and often several stages, of HEPA filtration is used as the final particulate removal method before air is discharged to the atmosphere. All in-place HEPA filters are required to have an efficiency of 99.95% in removing airborne particles with a median aerodynamic equivalent diameter of 0.3 μm. Filter efficiency is routinely tested. Past release data have shown that radionuclide concentrations in many emissions are below the lower limit of analytical detection.

2.1.2 Radionuclide Air Emissions Data

Release data on radionuclide air emissions from facilities, by area, are presented in Table 2-1. Tables 2-2 and 2-3 present data on the radionuclide air emissions from individual stacks and vents. The data consist of radionuclides detected or sampled for, average concentrations, and total activities.

Actively ventilated point source emissions are reported in this document when the following criteria were met during 1997: (1) point source requires continuous monitoring or periodic confirmatory measurements by 40 CFR 61, Subpart H, or WAC 246-247, (2) point source is registered with WDOH, and (3) the point source normally has radionuclide emissions or potentially had radionuclide emissions. Point sources not included in this section did not meet the previous criteria or their air emissions were not forcibly discharged (e.g., passively ventilated, sealed off, deactivated). Air emissions forcibly discharged (actively ventilated) by exhaust fans are sampled only if radioactive material could potentially be released.

2.2 NONRADIOACTIVE AIR EMISSIONS

In 1997, the nonradioactive air emissions were discharged from the following facilities: 284-E powerhouse, 284-WB oil fired package boiler, 300 Area powerhouse, East Tank Farms, 242-A Evaporator, West Tank Farms, and 200 West Area CCl_4 Vapor Extraction Project. Data on emissions from these sources are shown in Table 2-4. Powerhouse stack emissions were based on the quantity and type of fuel consumed, using formulas established by the EPA (EPA 450/4-90-003). Table 2-5 contains a summary of fuel consumption by the powerhouses.

Fabric-filter collection systems, called baghouses, remove particulate matter emitted from 284-E powerhouse. The 284-W powerhouse's baghouses have been shutdown since February 1995. The 300 Area powerhouse has no emissions control system, since its boilers are oil fired.

Table 2-1

Release Estimates of 1997 Radionuclide Air Emissions from FDH and BHI Facilities.

Radionuclide	Release, Ci[a]					
	100 Areas	200 East Area	200 West Area	300 Area	400 Area	Total
^{3}H (as HTO)	NM	NM	NM	2.4 E-01	7.9 E+00	8.1 E+00
^{3}H (as HT)	NM	NM	NM	5.5 E-01	NM	5.5 E-01
^{60}Co	ND	ND	ND	8.3 E-10	NM	8.3 E-10
^{90}Sr	2.1 E-05[b]	2.5 E-04[b]	3.0 E-04[b]	7.0 E-07[b]	NM	5.7 E-04[b]
^{106}Ru	ND	ND	NM	NM	NM	ND
^{113}Sn	ND	ND	NM	NM	NM	ND
^{125}Sb	3.7 E-09	ND	NM	NM	NM	3.7 E-09
^{129}I	NM	1.4 E-03	NM	NM	NM	1.4 E-03
^{131}I	NM	NM	NM	ND	ND	ND
^{134}Cs	ND	ND	ND	NM	NM	ND
^{137}Cs	5.5 E-05	9.1 E-04	7.7 E-09	7.5 E-07	4.6 E-06[c]	9.7 E-04[c]
^{152}Eu	ND	ND	ND	NM	NM	ND
^{154}Eu	ND	ND	ND	NM	NM	ND
^{155}Eu	ND	ND	ND	NM	NM	ND
Uranium, depleted[d]	NM	NM	NM	ND[d]	NM	ND
^{238}Pu	5.8 E-07	1.8 E-07	2.2 E-06	9.5 E-10	NM	3.0 E-06
$^{239,240}Pu$	3.9 E-06[e]	6.3 E-06[e]	1.1 E-04[e]	6.7 E-09[e]	3.8 E-07[e]	1.2 E-04[e]
^{241}Pu	4.0 E-05	6.4 E-06	4.6 E-05	NM	NM	9.2 E-05
^{241}Am	2.5 E-06	4.8 E-06	2.0 E-05	1.9 E-09	NM	2.7 E-05

Notes:

a 1 curie = 3.7 E+10 becquerel; ND = not detected (i.e., either the radionuclide was not detected in any sample during the year, or the average of all the measurements for that given radionuclide or type of radioactivity made during the year was below background levels); NM = not measured.

b This value includes total beta release data. Total beta results assumed to be ^{90}Sr for dose calculations.

c This value includes total beta release data. Total beta results assumed to be ^{137}Cs for dose calculations from FFTF emissions.

d Determined from total alpha measurements. Assumed to be depleted uranium consisting of 63.478 Ci% ^{238}U, 0.821 Ci% ^{235}U, and 35.701 Ci% ^{234}U (99.797 Wt% ^{238}U, 0.200 Wt% ^{235}U, and 0.003 Wt% ^{234}U).

e This value includes total alpha release data. Total alpha results assumed to be $^{239/240}Pu$ for dose calculations.

Table 2-2

(4 sheets)

1997 Hanford Site Radionuclide Air Emissions Data for Major Point Sources from FDH and BHI Facilities.
(major point sources have the potential of >0.1 mrem/yr EDE to nearest offsite resident)[a]

Source ID[b] (Facility/Contractor) [EDP codes]	Discharge height (m)	Emission control[c] (stages)	Total flow (m^3)	Radionuclide[d]	Average concentration ($\mu Ci/mL$)[e]	Annual emissions (Ci)[e]
200 East Area Point Sources						
291-A-1 (PUREX/FDH) [A552,A511,A007]	61.0	HEPA (3)	7.9 E+08	^{90}Sr	1.9 E-14	1.5 E-05
				^{106}Ru	ND	ND
				^{113}Sn	ND	ND
				^{125}Sb	ND	ND
				^{129}I	1.5 E-12	1.2 E-03
				^{134}Cs	ND	ND
				^{137}Cs	4.2 E-14	3.1 E-05
				^{238}Pu	1.9 E-16	1.5 E-07
				• $^{239,240}Pu$	3.8 E-15	3.1 E-06
				^{241}Pu	8.1 E-15	6.4 E-06
				• ^{241}Am	5.2 E-15	4.2 E-06
				total alpha	9.2 E-15	7.4 E-06
				total beta	6.0 E-14	4.7 E-05
291-B-1 (B Plant/FDH) [B691]	61.0	HEPA (2)	6.1 E+08	^{90}Sr	6.3 E-14	3.9 E-05
				^{134}Cs	ND	ND
				• ^{137}Cs	1.3 E-12	7.9 E-04
				^{238}Pu	4.2 E-17	2.6 E-08
				• $^{239,240}Pu$	4.7 E-15	2.9 E-06
				^{241}Am	9.4 E-16	5.7 E-07
				total alpha	2.7 E-15	1.7 E-06
				total beta	8.5 E-13	5.1 E-04
296-A-22 (242-A Evaporator/FDH) [E643,E002]	18.6	HEPA (2)	6.3 E+06	^{90}Sr	5.2 E-16	3.3 E-09
				• ^{106}Ru	ND	ND
				^{113}Sn	ND	ND
				^{125}Sb	ND	ND
				^{129}I	ND	ND
				^{134}Cs	ND	ND
				• ^{137}Cs	ND	ND
				^{238}Pu	ND	ND
				$^{239,240}Pu$	1.3 E-17	8.1 E-11
				^{241}Am	6.6 E-17	4.1 E-10
				total alpha	9.2 E-16	5.8 E-10
				total beta	3.7 E-15	2.3 E-08
296-A-12 (East Tank Farms/FDH) [E058]	45.7	HEPA (2)	0.0 E+00	• ^{90}Sr	(did not operate)	

Table 2-2

(4 sheets)

1997 Hanford Site Radionuclide Air Emissions Data for Major Point Sources from FDH and BHI Facilities.
(major point sources have the potential of >0.1 mrem/yr EDE to nearest offsite resident)[a]

Source ID[b] (Facility/Contractor) [EDT[c] codes]	Discharge height (m)	Emission control[c] (stages)	Total flow (m^3)	Radionuclide[d]	Average concentration ($\mu Ci/mL$)[e]	Annual emissions (Ci)[f]
296-A-17 296-P-26 (backup) (East Tank Farms/FDH) [E059,E026,E027] [E039,E040,E041]	15.2	HEPA (2)	4.8 E+07	^{90}Sr	3.5 E-14	1.6 E-06
				^{106}Ru	ND	ND
				^{113}Sn	ND	ND
				^{125}Sb	ND	ND
				^{129}I	4.6 E-12	2.1 E-04
				^{134}Cs	ND	ND
				• ^{137}Cs	4.6 E-13	2.0 E-05
				^{238}Pu	2.0 E-17	8.8 E-10
				$^{239,240}Pu$	1.4 E-16	6.9 E-09
				^{241}Am	1.4 E-16	7.5 E-09
				total alpha	6.6 E-16	2.9 E-08
				total beta	3.7 E-13	1.7 E-05
296-A-25 (East Tank Farms/FDH) [E080]	3.0	HEPA (2)	1.1 E+06	^{90}Sr	ND	ND
				^{134}Cs	ND	ND
				^{137}Cs	5.8 E-13	6.4 E-07
				^{238}Pu	ND	5.7 E-11
				$^{239,240}Pu$	5.2 E-17	ND
				^{241}Am	1.2 E-16	1.4 E-10
				total alpha	8.0 E-16	8.8 E-10
				total beta	5.7 E-13	6.3 E-07
296-B-28 (West Tank Farms/FDH) [E886]	3.4	HEPA (2)	3.1 E+06	^{90}Sr	5.6 E-16	1.7 E-09
				^{134}Cs	ND	ND
				• ^{137}Cs	2.5 E-16	7.4 E-10
				^{238}Pu	ND	ND
				• $^{239,240}Pu$	4.2 E-17	1.3 E-10
				• ^{241}Am	1.2 E-16	3.6 E-10
				total alpha	3.8 E-16	1.1 E-09
				total beta	5.4 E-15	1.7 E-08
296-C-5 (East Tank Farms/FDH) [E069]	14.6	HEPA (2)	4.8 E+07	• ^{90}Sr	1.9 E-15	9.2 E-08
				^{134}Cs	ND	ND
				^{137}Cs	3.5 E-15	1.7 E-07
				^{238}Pu	ND	ND
				$^{239,240}Pu$	2.4 E-17	1.2 E-09
				• ^{241}Am	4.7 E-17	2.2 E-09
				total alpha	1.7 E-16	8.1 E-09
				total beta	8.9 E-15	4.3 E-07
296-P-16 (East Tank Farms/FDH) [E068]	4.6	HEPA (2)	4.9 E+07	• ^{90}Sr	3.8 E-15	1.7 E-07
				^{134}Cs	ND	ND
				^{137}Cs	1.1 E-14	4.8 E-07
				^{238}Pu	4.0 E-18	1.8 E-10
				• $^{239,240}Pu$	9.5 E-17	4.3 E-09
				^{241}Am	1.1 E-16	4.8 E-09
				total alpha	6.2 E-17	2.8 E-09
				total beta	1.4 E-14	6.2 E-07

Table 2-2

(4 sheets)

1997 Hanford Site Radionuclide Air Emissions Data for Major Point Sources from FDH and BHI Facilities
(major point sources have the potential of >0.1 mrem/yr EDE to nearest offsite resident)[a]

Source ID[b] (Facility/Contractor) [EDP codes]	Discharge height (m)	Emission control[c] (stages)	Total flow (m^3)	Radionuclide[d]	Average concentration ($\mu Ci/mL$)[e]	Annual emissions (Ci)[e]
296-P-32 (East Tank Farms/FDH) [E401]	4.6	HEPA (2)	1.4 E+03	• ^{90}Sr total alpha total beta	NM ND 1.5 E-12	NM ND 2.1 E-09
200 West Area Point Sources						
291-Z-1 (PFP/FDH) [Z810]	61.0	HEPA (1-3)	4.3 E+09	^{238}Pu • $^{239,240}Pu$ ^{241}Pu • ^{241}Am total alpha total beta	5.0 E-16 2.1 E-14 1.1 E-14 4.7 E-15 2.4 E-14 2.8 E-15	2.2 E-06 9.3 E-05 4.6 E-05 2.0 E-05 1.1 E-04 1.2 E-05
296-S-22 (West Tank Farms/FDH) [W880]	3.7	HEPA (2)	2.1 E+06	• ^{90}Sr ^{134}Cs • ^{137}Cs ^{238}Pu $^{239,240}Pu$ • ^{241}Am total alpha total beta	3.2 E-15 ND 2.4 E-16 ND 2.2 E-17 5.3 E-17 2.5 E-16 4.6 E-15	6.6 E-09 ND 5.0 E-10 ND 4.7 E-11 1.1 E-10 5.2 E-10 9.5 E-09
296-T-18 (West Tank Farms/FDH) [W882]	3.7	HEPA (2)	3.5 E+06	^{90}Sr ^{134}Cs • ^{137}Cs ^{238}Pu • $^{239,240}Pu$ • ^{241}Am total alpha total beta	ND ND 2.0 E-15 2.4 E-18 7.4 E-17 1.4 E-16 5.0 E-16 4.9 E-15	ND ND 7.2 E-09 8.6 E-12 2.6 E-10 5.1 E-10 1.8 E-09 1.7 E-08
300 Area Point Sources						
340-NT-EX (340 Waste Handling/FDH) [F002,F007]	5.5	HEPA (2)	2.6 E+07	^{131}I ^{137}Cs • ^{238}Pu $^{239,240}Pu$ • ^{241}Am total alpha total beta	ND ND ND ND ND 4.5 E-17 2.6 E-16	ND ND ND ND ND 1.2 E-09 6.9 E-09

Table 2-2 (4 sheets)

1997 Hanford Site Radionuclide Air Emissions Data for Major Point Sources from FDH and BHI Facilities.
(major point sources have the potential of ≥0.1 mrem/yr EDE to nearest offsite resident)[a]

Source ID[b] (Facility/Contractor) [EDP[b] codes]	Discharge height (m)	Emission control[c] (stages)	Total flow (m^3)	Radionuclide[d]	Average concentration ($\mu Ci/mL$)[e]	Annual emissions (Ci)[e]
EP-324-01-S (324 Bldg./FDH) [F025,F028]	48.0	HEPA (2)	1.0 E+09	^{3}H (as HTO)[f]	1.3 E-10	1.3 E-01
				^{3}H (as HT)[f]	4.8 E-10	4.9 E-01
				• ^{90}Sr	3.8 E-17	3.9 E-08
				• ^{137}Cs	ND	ND
				^{238}Pu	ND	ND
				$^{239/240}Pu$	ND	ND
				^{241}Am	ND	ND
				total alpha	ND	ND
				total beta	1.5 E-16	1.6 E-07
EP-327-01-S (327 Bldg./FDH) [F026,F029]	27.1	HEPA (2)	1.5 E+09	^{3}H (as HTO)[f]	1.6 E-10	1.1 E-01
				^{3}H (as HT)[f]	6.3 E-11	4.6 E-02
				^{90}Sr	3.1 E-16	2.3 E-07
				^{137}Cs	1.0 E-15	7.5 E-07
				^{220}Rn	6.8 E-08	5.0 E+01
				^{222}Rn	2.2 E-09	1.6 E+00
				• ^{238}Pu	1.3 E-18	9.5 E-10
				$^{239,240}Pu$	9.2 E-18	6.7 E-09
				^{241}Am	8.8 E-18	6.4 E-09
				total alpha	1.1 E-16	8.1 E-08
				total beta	3.1 E-15	2.3 E-06
EP-327-02-V (327 Decon. Cell/FDH) [F027]	14.0	HEPA (2)	1.1 E+07	^{60}Co	7.5 E-17	8.3 E-10
				^{90}Sr	ND	ND
				^{137}Cs	2.1 E-16	2.3 E-09
				• ^{238}Pu	ND	ND
				$^{239,240}Pu$	ND	ND
				^{241}Am	1.0 E-18	1.1 E-11
				total alpha	ND	ND
				total beta	5.6 E-16	2.3 E-06

Notes:

a Determining the state of National Emission Standards for Hazardous Air Pollutants Subpart H compliance for each point source involved using nearest offsite residences, which differed from the MEI; EDE = effective dose equivalent.

b ID = identification, i.e., the alpha-numeric designator for the respective point source; EDP Code = electronic data processing code for sampler identification; FDH = Fluor Daniel Hanford, Inc.; BHI = Bechtel Hanford, Inc.

c Efficiencies are: ≥99.95% for HEPA; ≥95% for charcoal; ≥99.8% for sand filter; 0% for no emission control; HEPA = high efficiency particulate air filter.

d Bullets, "•", identify specific radionuclides sampling and analysis required by 40 CFR 61 Subpart H.

e 1 $\mu Ci/mL$ = 3.7 E+10 Bq/m^3; 1 curie = 3.7 E+10 becquerel; ND = not detected (i.e., either the radionuclide was not detected in any sample during the year, or the average of all the measurements for that given radionuclide or type of radioactivity made during the year was below background levels).

f HTO is tritium as condensable water vapor; HT is tritium as incondensable gas.

Table 2-3 (7 sheets)

1997 Hanford Site Radionuclide Air Emissions Data for Minor Point Sources from FDH and BHI,
(minor point sources have the potential of <0.1 mrem/yr EDE to nearest offsite resident)[a]

Source ID[b] (Facility/Contractor) [EDP codes]	Discharge height (m)	Emission control[c]	Total flow (m^3)	Radionuclide	Average concentration ($\mu Ci/mL$)[d]	Annual emissions (Ci)[d]
100 Area Point Sources						
116-N (100 N Area/BHI) [Y211,Y212,Y213]	61.3	HEPA, charcoal	1.3 E+09	^{60}Co ^{90}Sr ^{137}Cs ^{238}Pu $^{239/240}Pu$ ^{241}Am total alpha total beta	ND 2.2 E-15 ND ND 2.1 E-17 1.8 E-16 1.0 E-16 4.5 E-15	ND 2.8 E-06 ND ND 2.6 E-08 2.2 E-07 1.3 E-07 5.8 E-06
107-N (100 N Area/BHI) [Y265,Y266]	12.0	HEPA	1.1 E+08	total alpha total beta	ND 1.2 E-15	ND 1.8 E-07
RCF-1-EX (100 N Area/BHI) [Y215]	3.0	HEPA	2.6 E+05	total alpha total beta	1.8 E-15 3.2 E-15	4.6 E-10 8.2 E-10
105-KE Basin (100 K Area/FDH) [Y245-Y248]	12.8	none	6.8 E+08	^{60}Co ^{90}Sr ^{106}Ru ^{125}Sb ^{134}Cs ^{137}Cs ^{154}Eu ^{155}Eu ^{238}Pu $^{239/240}Pu$ ^{241}Pu ^{241}Am total alpha total beta	ND 2.3 E-14 ND 5.5 E-18 ND 6.9 E-14 ND ND 8.4 E-16 5.3 E-15 5.7 E-14 3.3 E-15 1.4 E-14 1.3 E-13	ND 1.6 E-05 ND 3.7 E-09 ND 4.8 E-05 ND ND 5.7 E-07 3.6 E-06 3.9 E-05 2.3 E-06 9.9 E-06 9.3 E-05

Table 2-3 (7 sheets)

1997 Hanford Site Radionuclide Air Emissions Data for Minor Point Sources from FDH and BHI
(minor point sources have the potential of <0.1 mrem/yr EDE to nearest offsite resident)[a]

Source ID[b] (Facility/Contractor) [EDP codes]	Discharge height (m)	Emission control[c]	Total flow (m^3)	Radionuclide	Average concentration ($\mu Ci/mL$)[d]	Annual emissions (Ci)[d]
105-KW Basin (100 K Area/FDH) [Y234-Y236]	12.8	none	4.2 E+08	^{60}Co ^{90}Sr ^{106}Ru ^{125}Sb ^{134}Cs ^{137}Cs ^{154}Eu ^{155}Eu ^{238}Pu $^{239/240}Pu$ ^{241}Pu ^{241}Am total alpha total beta	5.3 E-18 2.0 E-15 ND ND ND 1.6 E-14 ND ND 1.6 E-17 9.0 E-17 1.4 E-15 1.2 E-16 3.2 E-15 3.8 E-14	2.3 E-09 8.3 E-07 ND ND ND 7.1 E-06 ND ND 6.8 E-09 3.8 E-08 6.2 E-07 4.9 E-08 1.4 E-06 1.6 E-05
1706-KER -27 ft (100 K Area/FDH) [Y244]	0.9	HEPA	1.6 E+06	total alpha total beta	ND ND	ND ND
1706-KE (100 K Area/FDH) [Y243]	7.6	HEPA	9.1 E+07	total alpha total beta	2.2 E-15 1.2 E-14	1.9 E-07 1.1 E-06
200 East Area Point Sources						
296-B-5 (B Plant/FDH) [B686]	3.7	HEPA	1.0 E+07	total alpha total beta	9.7 E-16 4.8 E-15	9.9 E-09 4.9 E-08
296-B-10 (WESF/FDH) [B748]	22.9	HEPA	3.1 E+08	^{90}Sr ^{134}Cs ^{137}Cs total alpha total beta	6.2.E-13 ND 2.1 E-13 4.4 E-15 8.9 E-13	1.8 E-04 ND 6.1 E-05 1.3 E-06 2.6 E-04
296-B-13 (B Plant/FDH) [B690]	3.5	HEPA	1.2 E+06	total alpha total beta	2.3 E-15 5.8 E-15	2.8 E-09 7.2 E-09
296-A-13 (East Tank Farms/FDH) [E052]	38.1	HEPA	0.0 E+00	total alpha total beta	(did not operate)	
296-A-18 (East Tank Farms/FDH) [E060]	4.6	HEPA	9.6 E+06	total alpha total beta	1.2 E-15 3.8 E-15	1.2 E-08 3.7 E-08

Table 2-3 (7 sheets)

1997 Hanford Site Radionuclide Air Emissions Data for Minor Point Sources from FDH and BHI.
(minor point sources have the potential of < 0.1 mrem/yr EDE to nearest offsite resident)[a]

Source ID[b] (Facility/Contractor) [EDP codes]	Discharge height (m)	Emission control[c]	Total flow (m^3)	Radionuclide	Average concentration ($\mu Ci/mL$)[d]	Annual emissions (Ci)[d]
296-A-19 (East Tank Farms/FDH) [E061]	4.6	HEPA	1.6 E+07	total alpha total beta	6.3 E-16 1.6 E-15	1.0 E-08 2.7 E-08
296-A-20 (East Tank Farms/FDH) [E197]	7.3	HEPA	0.0 E+00	total alpha total beta	(did not operate)	
296-A-26 (East Tank Farms/FDH) [E297]	9.4	HEPA	2.5 E+07	total alpha total beta	3.4 E-17 1.8 E-16	8.5 E-10 4.5 E-09
296-A-27 (East Tank Farms/FDH) [E270,E933,E934]	3.7	HEPA	1.5 E+07	total alpha total beta	2.1 E-16 5.7 E-15	3.2 E-09 1.4 E-07
296-A-28 (East Tank Farms/FDH) [E272]	3.7	HEPA	7.8 E+07	total alpha total beta	ND 2.8 E-14	ND 2.2 E-06
296-A-29 (East Tank Farms/FDH) [E901]	3.7	HEPA	1.1 E+07	total alpha total beta	8.3 E-17 6.2 E-14	9.1 E-10 6.8 E-07
296-A-30 (East Tank Farms/FDH) [E903]	3.7	HEPA	7.4 E+07	total alpha total beta	6.9 E-16 2.9 E-15	5.1 E-08 2.2 E-07
296-A-40 (East Tank Farms/FDH) [E013,E028,E029]	4.1	HEPA	1.4 E+07	^{90}Sr ^{106}Ru ^{113}Sn ^{125}Sb ^{129}I ^{134}Cs ^{137}Cs ^{238}Pu $^{239,240}Pu$ ^{241}Am total alpha total beta	8.4 E-17 ND ND ND ND ND 7.6 E-17 ND 3.1 E-17 4.9 E-17 ND 2.1 E-15	1.1 E-09 ND ND ND ND ND 1.0 E-09 ND 4.2 E-10 6.8 E-10 ND 2.9 E-08
296-A-41 (East Tank Farms/FDH) [E015]	8.9	HEPA	1.2 E+08	total alpha total beta	ND 2.1 E-15	ND 2.6 E-07

Table 2-3

(7 sheets)

1997 Hanford Site Radionuclide Air Emissions Data for Minor Point Sources from FDH and BHI.
(minor point sources have the potential of <0.1 mrem/yr EDE to nearest offsite resident)[a]

Source ID[b] (Facility/Contractor) [EDF codes]	Discharge height (m)	Emission control[c]	Total flow (m^3)	Radionuclide	Average concentration ($\mu Ci/mL$)[d]	Annual emissions (Ci)[d]
296-P-17 (East Tank Farms/FDH) [E120]	4.6	HEPA	0.0 E+00	total alpha total beta	(did not operate)	
296-P-31 (East Tank Farms/FDH) [E209]	10.0	HEPA	1.6 E+07	total alpha total beta	1.8 E-17 7.7 E-16	2.9 E-10 1.3 E-08
296-P-33 296-P-34 (Char. Project/FDH) [FDH]	4.6	HEPA	0.0 E+00	total alpha total beta	(did not operate)	
296-A-21 (242-A Evaporator/FDH) [E645]	6.7	HEPA	1.8 E+08	total alpha total beta	1.9 E-16 2.2 E-14	3.6 E-08 4.0 E-06
296-E-1 (ETF/FDH) [E036]	15.5	HEPA	8.2 E+08	total alpha total beta	1.3 E-16 4.9 E-16	1.1 E-07 4.1 E-07
296-G-1 (Grout/FDH) [E032]	7.6	HEPA	0.0 E+00	total alpha total beta	(did not operate)	
200 West Area Point Sources						
296-P-22 (West Tank Farms/FDH) [W191]	4.6	HEPA	1.3 E+07	total alpha total beta	3.5 E-16 4.8 E-15	4.4 E-09 6.1 E-08
296-P-23 296-P-28 (backup) (West Tank Farms/FDH) [W190,W195]	4.6	HEPA	1.3 E+07	total alpha total beta	2.0 E-16 8.2 E-14	2.7 E-09 1.1 E-06
296-S-15 (West Tank Farms/FDH) [W111]	4.6	HEPA	5.1 E+07	total alpha total beta	1.8 E-16 8.7 E-15	9.0 E-09 4.4 E-07
296-S-18 (West Tank Farms/FDH) [W096]	6.7	HEPA	1.1 E+08	total alpha total beta	1.1 E-15 3.8 E-15	1.1 E-07 4.1 E-07
296-T-17 (West Tank Farms/FDH) [W117]	10.1	HEPA	1.7 E+07	total alpha total beta	ND 2.0 E-15	ND 3.4 E-08

Table 2-3

(7 sheets)

1997 Hanford Site Radionuclide Air Emissions Data for Minor Point Sources from FDH and BHI.
(minor point sources have the potential of <0.1 mrem/yr EDE to nearest offsite resident)[a]

Source ID[b] (Facility/Contractor) [EDP codes]	Discharge height (m)	Emission control[c]	Total flow (m^3)	Radionuclide	Average concentration ($\mu Ci/mL$)[d]	Annual emissions (Ci)[d]
296-W-3 (West Tank Farms/FDH) [W003]	7.6	HEPA	4.9 E+06	total alpha total beta	6.6 E-15 9.2 E-15	3.2 E-08 4.5 E-08
291-S-1 (S Plant/BHI) [S006]	61.0	sand filter	3.0 E+08	total alpha total beta	ND 1.5 E-14	ND 4.8 E-06
296-S-2 (S Plant/BHI) [S032]	20.7	HEPA	1.1 E+07	total alpha total beta	3.0 E-15 6.4 E-15	3.3 E-08 6.9 E-08
296-S-7W 296-S-7E (backup) (S Plant/BHI) [S015,S016]	7.6	HEPA	1.2 E+08	total alpha total beta	2.7 E-14 6.2 E-14	3.2 E-06 7.4 E-06
291-U-1 (U Plant/BHI) [U771]	61.0	sand filter	3.9 E+08	total alpha total beta	2.1 E-15 5.1 E-13	8.1 E-07 2.0 E-04
291-T-1 (T Plant/FDH) [T785]	61.0	HEPA	4.8 E+08	total alpha total beta	2.2 E-14 1.5 E-13	1.0 E-05 7.5 E-05
296-T-7 (T Plant/FDH) [T154]	8.5	HEPA	4.4 E+07	total alpha total beta	2.6 E-16 7.6 E-16	1.1 E-08 3.3 E-08
296-T-13 (T Plant/FDH) [T786]	20.7	HEPA	0.0 E+00	total alpha total beta	(did not operate)	
296-T-11 (TRUSAF/FDH) [T783]	7.6	HEPA	0.0 E+00	total alpha total beta	(did not operate)	
296-T-12 (TRUSAF/FDH) [T784]	7.6	HEPA	2.4 E+08	total alpha total beta	1.0 E-15 8.2 E-15	2.4 E-07 2.0 E-06
296-S-16 (222-S/FDH) [S264]	3.0	HEPA	2.2 E+06	total alpha total beta	3.3 E-15 1.8 E-14	7.2 E-09 4.0 E-08
296-S-21 (222-S/FDH) [S289]	11.6	HEPA	1.1 E+09	total alpha total beta	ND 8.1 E-16	ND 8.5 E-07

Table 2-3 (7 sheets)

1997 Hanford Site Radionuclide Air Emissions Data for Minor Point Sources from FDH and BHI.
(minor point sources have the potential of <0.1 mrem/yr EDE to nearest offsite resident)[a]

Source ID[b] (Facility/Contractor) [EDP codes]	Discharge height (m)	Emission control[c]	Total flow (m^3)	Radionuclide	Average concentration ($\mu Ci/ml$)[d]	Annual emissions (Ci)[d]
296-Z-3 (PFP/FDH) [Z813]	7.6	HEPA	1.3 E+07	^{238}Pu $^{239/240}Pu$ ^{241}Pu ^{241}Am total alpha total beta	1.9 E-15 1.7 E-15 3.6 E-15 8.1 E-16 5.2 E-15 5.2 E-15	3.1 E-08 2.7 E-08 5.6 E-08 1.3 E-08 6.7 E-08 6.8 E-08
296-Z-5 (PFP/FDH) [Z913]	8.5	HEPA	1.1 E+08	total alpha total beta	ND 1.2 E-15	ND 1.8 E-07
296-Z-6 (PFP/FDH) [Z802]	4.5	HEPA	1.1 E+08	total alpha total beta	ND 4.8 E-15	ND 5.2 E-07
296-Z-14 (PFP/FDH) [Z814]	6.1	HEPA	2.0 E+07	total alpha total beta	2.9 E-16 2.6 E-15	5.7 E-09 5.1 E-08
296-Z-15 (PFP/FDH) [Z915]	12.8	HEPA	2.1 E+06	total alpha total beta	2.2 E-17 2.5 E-16	4.6 E-11 5.0 E-10
696-W-1 (WSCF/FDH) [W010]	7.6	HEPA	7.4 E+08	total alpha total beta	ND 7.7 E-17	ND 5.8 E-08
696-W-2 (WSCF/FDH) [W011]	9.8	HEPA	2.2 E+07	total alpha total beta	ND 7.9 E-16	ND 1.8 E-08
300 Area Point Sources						
309-PRTR[e] (309 Bldg./FDH)	30.5	HEPA	7.2 E+07	total alpha total beta	ND ND	ND ND
340-B-BLDG (340 Bldg./FDH) [F008]	11.6	HEPA	9.3 E+05	total alpha total beta	ND ND	ND ND
340-DECON (340 Bldg./FDH) [F009]	3.0	HEPA	1.1 E+08	total alpha total beta	ND 4.0 E-15	ND 4.3 E-07

Table 2-3

(7 sheets)

1997 Hanford Site Radionuclide Air Emissions Data for Minor Point Sources from FDH and BHI
(minor point sources have the potential of <0.1 mrem/yr EDE to nearest offsite resident)[a]

Source ID[b] (Facility/Contractor) [EDP codes]	Discharge height (m)	Emission control[c]	Total flow (m^3)	Radionuclide	Average concentration (μCi/mL)[d]	Annual emissions (Ci)[d]
400 Area Point Sources						
FFTF-CB-EX (FFTF/FDH) [F011]	14.3	none	3.1 E+08	^{3}H (as HTO) ^{131}I total alpha total beta	2.5 E-08 ND 3.6 E-16 4.8 E-15	7.9 E+00 ND 1.1 E-07 1.5 E-06
FFTF-RE-SB (FFTF/FDH) [F012]	6.1	none	1.9 E+08	^{131}I total alpha total beta	ND 1.1 E-15 1.2 E-14	ND 2.0 E-07 2.1 E-06
FFTF-HT-TR (FFTF/FDH) [F013]	8.8	none	8.0 E+07	total alpha total beta	2.1 E-16 2.7 E-15	1.7 E-08 2.2 E-07
437-MN&ST (MASF/FDH) [F014]	9.1	HEPA	2.3 E+08	total alpha total beta	2.5 E-16 2.6 E-15	5.5 E-08 5.9 E-07
437-1-61 (MASF/FDH) [F019]	11.7	HEPA	2.3 E+08	total alpha total beta	ND 4.0 E-16	ND 9.0 E-08

Notes:

a EDE = effective dose equivalent.

b ID = identification, i.e., the alpha-numeric designator for the respective point source; EDP code = electronic data processing code for sampler identification; FDH = Fluor Daniel Hanford, Inc.; BHI = Bechtel Hanford, Inc.

c Efficiencies are: ≥99.95% for HEPA; ≥95% for charcoal; ≥99.8% for sand filter; 0% for no emission control; HEPA = high efficiency particulate air filter.

d 1 μCi/mL = 3.7 E+10 Bq/mL; 1 curie = 3.7 E+10 becquerel; ND = none detected (i.e. either the radionuclide was not detected in any sample during the year, or the average of all the measurements for that given radionuclide or type of radioactivity made during the year was below background levels).

Table 2-4 (3 sheets)

1997 Hanford Site Nonradioactive Air Emissions Data by Source

Source Identification (Contractor[a])	Constituent	Annual Emissions (kg)[b]
284-E Powerhouse (FDH)	**Criteria Air Pollutants:**	
	Particulate matter	1.41 E+03
	Nitrogen oxides (NO_x)	1.46 E+05
	Sulfur oxides (SO_x)	2.35 E+05
	Carbon monoxide (CO)	5.32 E+04
	Lead	1.40 E+02
	Volatile organic compounds	5.32 E+02
	Toxic Air Pollutants:	
	Arsenic	1.50 E+02
	Beryllium	2.02 E+01
	Cadmium	1.19 E+01
	Chromium	4.34 E+02
	Cobalt	0.00
	Copper	2.73 E+02
	Formaldehyde	6.12 E+01
	Manganese	6.01 E+02
	Mercury	4.43 E+00
	Nickel	3.57 E+02
	Polycyclic organic matter	0.00
	Selenium	5.42 E+01
	Vanadium	3.74 E+01
284-WB Oil Fired Package Boiler (FDH)	**Criteria Air Pollutants:**	
	Particulate matter	3.96 E+01
	Nitrogen oxides (NO_x)	3.98 E+02
	Sulfur oxides (SO_x)	1.40 E+02
	Carbon monoxide (CO)	9.89 E+01
	Lead	2.46 E-02
	Volatile organic compounds	3.96 E+00
	Toxic Air Pollutants:	
	Arsenic	1.16 E-02
	Beryllium	6.92 E-03
	Cadmium	3.05 E-02
	Chromium	1.32 E-01
	Cobalt	0.00
	Copper	7.75 E-01
	Formaldehyde	1.12 E+00
	Manganese	3.88 E-02
	Mercury	8.31 E-03
	Nickel	4.98 E-02
	Polycyclic organic matter	4.35 E+02
	Selenium	6.50 E-02
	Vanadium	1.93 E-01

Table 2-4 (3 sheets)

1997 Hanford Site Nonradioactive Air Emissions Data by Source

Source Identification (Contractor)[a]	Constituent	Annual Emissions (kg)[b]
300 Area Powerhouse (FDH)	Criteria Air Pollutants:	
	Particulate matter	1.07 E+04
	Nitrogen oxides (NO_x)	3.80 E+04
	Sulfur oxides (SO_x)	1.44 E+05
	Carbon monoxide (CO)	3.45 E+03
	Lead	2.05 E+01
	Volatile organic compounds	1.93 E+02
	Toxic Air Pollutants:	
	Arsenic	1.20 E+01
	Beryllium	4.44 E-01
	Cadmium	2.23 E+01
	Chromium	1.35 E+01
	Cobalt	1.28 E+01
	Copper	2.94 E+01
	Formaldehyde	4.28 E+01
	Manganese	7.82 E+00
	Mercury	3.38 E+00
	Nickel	2.46 E+02
	Polycyclic organic matter	5.80 E+03
	Selenium	4.01 E+00
	Vanadium	3.19 E+02
ESPC Distillate Oil Fired Boilers (FDH)	Criteria Air Pollutants:	
	Particulate matter	2.66 E+01
	Nitrogen oxides (NO_x)	2.70 E+02
	Sulfur oxides (SO_x)	9.03 E+01
	Carbon monoxide (CO)	1.26 E+02
	Lead	0.00
	Volatile organic compounds	2.30 E+01
ESPC Natural Gas Fired Boilers (FDH)	Criteria Air Pollutants:	
	Particulate matter	2.30 E-01
	Nitrogen oxides (NO_x)	1.95 E+00
	Sulfur oxides (SO_x)	1.00 E-02
	Carbon monoxide (CO)	4.39 E+00
	Lead	0.00
	Volatile organic compounds	2.50 E-01
East Tank Farms Exhausters (FDH)	Nitrogen oxides (NO_x)	1.51 E+04
	Volatile organic Compounds	5.35 E+02
	Ammonia	3.59 E+03
West Tank Farms Exhausters (FDH)	Nitrogen oxides (NO_x)	1.59 E+04
	Volatile organic compounds	1.63 E+02
	Ammonia	2.79 E+03

Table 2-4

(3 sheets)

1997 Hanford Site Nonradioactive Air Emissions Data by Source

Source Identification (Contractor[a])	Constituent	Annual Emissions (kg)[b]
242-A Evaporator (FDH)	Volatile organic compounds Ammonia	7.27 E+01 5.00 E+00
200 Area ETF (FDH)	Volatile organic compounds Ammonia	5.45 E+00 9.09 E-01
200 West Area CCl_4 Vapor Extraction Project (BHI)	Carbon tetrachloride	2 E-01

Notes:

a FDH = Fluor Daniel Hanford, Inc.; BHI = Bechtel Hanford, Inc.

b Powerhouse emissions calculated using EPA emission factors (EPA 450/4-90-003) and based on total fuel consumption.

Table 2-5

1997 Fuel Consumption from Powerhouse Boilers					
	Source[a]				
Fuel consumed	284-E Powerhouse	284-W Powerhouse	300 Area Powerhouse	ESPC oil fired boilers	ESCP gas fired boilers
Coal, kg	2.13 E+07				
Grade 2 Oil, L		1.65 E+05		1.16 E+07	
Grade 6 Oil, L			4.07 E+06		
Natural Gas, L					1.06 E+05

Note:
a ESPC = energy savings performance contract.

3.0 LIQUID EFFLUENTS

The majority of liquid effluents released to the environment from facilities and activities managed by FDH and BHI were discharged under the appropriate state and federal discharge permits. Data on the 1997 radioactive and nonradioactive liquid effluents are presented in this section.

By the end of June 1995, several liquid effluent streams were either discontinued or rerouted through the 200 Area TEDF, eliminating these as individual liquid effluent streams. The streams rerouted included the Plutonium Finishing Plant waste water, 222-S Laboratory steam condensate, T Plant waste water, 284-W Power Plant waste water, PUREX Plant waste water, B Plant waste water, and 242-A-81 waste water streams. As a result, these streams no longer discharge directly to the environment and no longer require reporting as effluent streams.

On August 8, 1997, the remaining liquid effluent streams discharging to the 216-B-3 Pond (C Lobe) were permanently rerouted to the 200 Area TEDF, eliminating these as individual liquid effluent streams. The streams rerouted included the 242-A Evaporator cooling water, 242-A Evaporator steam condensate, 241-A Tank Farm cooling water, 244-AR Vault cooling water, 284-E Power Plant waste water, and B Plant cooling water streams. After 1997, these streams no longer discharge directly to the environment and will no longer require reporting as effluent streams.

3.1 NPDES PERMITTED DISCHARGES TO COLUMBIA RIVER

Liquid effluents discharged to the Columbia River from the 100 N, 100 K, and 300 Areas are regulated by the parameters in the NPDES permits (WA-000374-3, WA-002591-7, and WA-R-10-000F) for the Hanford Site. A list of the NPDES permitted discharge points and is provided in Table 3-1. Summaries of the 1997 discharge monitoring reports (DMRs), which are used to demonstrate compliance with the NPDES permits, are provided in Table 3-2.

The measured quantities of radionuclides discharged in liquid effluents to the Columbia River are summarized in the Executive Summary, Table ES-2. Releases of specific radionuclides and total activity discharged by individual liquid effluent streams are presented in Table 3-3.

The following sections discuss the NPDES permitted discharge streams active during 1997.

3.1.1 1908-K Outfall

1908-K Outfall, Discharge Number 004, discharges potentially hazardous chemical and radioactive substances to the Columbia River. The outfall is routinely monitored for flow, temperature, pH, total suspended solids, and chlorine. The outfall is also routinely monitored for the following radionuclides: ^{3}H, ^{90}Sr, ^{238}Pu, $^{239/240}Pu$, ^{241}Am, gamma emitting radionuclides, total alpha activity, and total beta activity.

3.1.2 N-Springs

N-Springs, Discharge Number 1301, discharges potentially hazardous chemical and radioactive substances to the Columbia River. The outfall is routinely monitored for pH, oil and grease, chromium, iron, and nitrogen. N-Springs are also routinely monitored for ^{3}H and ^{90}Sr.

3.1.3 300 Area TEDF

300 Area TEDF, Discharge Number 001A, discharges treated waste water, under NPDES permit WA-002591-7. The outfall is routinely monitored for numerous constituents, which are listed in Table 3-2.

All nonradioactive liquid effluents from the 300 Area are discharged to the 300 Area TEDF for treatment prior to discharge. 300 Area TEDF discharged 6.2 E+08 L (1.7 E+08 Gal) of nonhazardous nonradioactive liquid wastes to the Columbia River during 1997. All radioactive liquid effluents from the 300 Area were transported to the TanK Farms in the 200 East Area, via the 340 Facility, located in the 300 Area.

3.2 STATE PERMITTED DISCHARGES TO THE SOIL

During 1997, all liquid effluent streams discharging to the soil column were either covered by a state waste discharge permit or a permit application was submitted to permit the discharge, unless exempted under CERCLA or regulatory agreements with Ecology. Most of the liquid effluent streams preceded regulation by the state. The Hanford Site has made a significant effort to bring all of the liquid effluent streams into compliance with state regulations. Liquid effluent streams with state waste discharge permits is provided in Table 3-1.

3.2.1 200 Area TEDF

200 Area TEDF discharges waste water, under state waste discharge permit ST 4502. The outfall is routinely monitored for a multitude of constituents, which are all listed in Table 3-4.

3.2.2 200 Area ETF

200 Area ETF discharges treated waste water, under state waste discharge permit ST 4500. The outfall is routinely monitored for numerous chemical and radioactive constituents, which are listed in Tables 3-3 and 3-4.

3.2.3 400 Area Secondary Cooling Water

400 Area Secondary Cooling Water Stream discharges cooling water from the secondary cooling loop of the FFTF reactor, under state waste discharge permit ST 4503. The cooling water discharges meet the drinking water standard. The discharge point is routinely monitored for flow, pH, nitrate, nitrite, arsenic, chloride, cyanide, manganese, phosphorus, total dissolved solids, total organic halides, total beta activity, and tritium.

3.2.4 183-N Backwash Discharge Pond

Waste water discharges going to the 183-N Backwash Discharge Pond is associated with 183-N Water Treatment Facility activities, and are performed under state waste discharge permit ST 4503. The 183-N Water Treatment Facility converts raw water, from the Columbia River, into potable water for the 100-N Area. Three waste water streams are discharged to the 183-N Backwash Discharge Pond without treatment. These streams contain waste water from the annual draining and washing of the coagulator basins, a continuously flowing sample tap and a water container drying area drain, and from backwashing the multimedia gravity filters. The discharge site is routinely monitored for flow rate, pH, sulfate, trihalomethanes, and residual chlorine.

3.2.5 100-N Sewage Lagoon

100-N Sewage Lagoon treats sewage from the 100-N and 200 Areas. Domestic waste water is discharged from the 100-N Sewage Lagoon, under state waste discharge permit ST 4507. The discharge of leachate, from the residual solids, and radioactive waste is not permitted for this discharge site. The discharge site is routinely monitored for influent flow, effluent flow, pH, biochemical oxygen demand, total suspended solids, and total dissolved solids.

3.2.6 Hydrotesting, Maintenance, and Construction Discharges

Waste water discharges as a result of hydrotesting, maintenance, and construction activities are performed under state waste discharge permit ST 4508. These discharges occur at numerous locations throughout the Hanford Site and only require monitoring and reporting for significant discharges.

3.2.7 Cooling Water and Steam Condensate Discharges

Cooling water and steam condensate discharges are performed under state waste discharge permit ST 4509. These discharges occur at numerous locations throughout the Hanford Site and do not require routine monitoring and reporting.

3.2.8 Storm Water Discharges

A permit application for storm water discharges has been submitted to Ecology, but a permit has not been issued at the time of this report. Storm water discharges occur at numerous locations throughout the Hanford Site and are not routinely monitored and reported.

3.3 SANITARY SEWAGE DISCHARGES TO THE SOIL

Various facilities discharged sanitary sewage. In the 100-N Area, sanitary waste water was discharged to the 100-N Sewage Lagoon and five septic tanks. In the 100-B, 100-D, 100-H, and 100-K Areas, sanitary sewage was discharged to septic tanks and drain fields. In the 200 Areas, sanitary waste water was discharged to a system of septic tanks and drain fields. Sludge was pumped from septic tanks in the 200 Areas and taken to the 100-N Sewage Lagoon for disposal. In the 300 Area, sanitary sewage was discharged to the city of Richland's POTW. In the 400 Area, sanitary sewage was discharged to a sewage treatment plant and lagoon until April 15, 1997, when discharges started going to the Washington Public Power Supply's sewage treatment plant.

The estimated volume of sewage discharged by operating area during 1997 is shown in Table 3-5. All sanitary sewer discharges are estimated by multiplying the total number of personnel stationed in each area by 95 L/day-person (25 gal/day-person) and by the 251 business days in 1997.

Table 3-1

National Pollutant Discharge Elimination System (NPDES) and State Permitted Discharge Points	
Designation	**Description**
NPDES Discharge Points	
001A	300 Area Treated Effluent Disposal Facility (TEDF)
003[a]	181-KE Inlet Screen Backwash
004	1908-K Outfall
005[a]	182-N Tank Farm Overflow (36-in. raw water return)
006[a]	182-N Drain System (42-in. raw water return)
007[a]	181-N Inlet Screen Backwash
009[a]	102-in. Outfall (raw water return)
N-Springs	100-N Riverbank Springs
State Permitted Discharge Points	
ST 4502	200 Area Treated Effluent Disposal Facility (TEDF)
ST 4500	200 Area Effluent Treatment Facility (ETF)
ST 4501	400 Area Secondary Cooling Water
ST 4507	100-N Sewage Treatment Lagoon
ST 4503	183-N Backwash Discharge Pond
ST 4508	Hydrotesting, Maintenance, and Construction Discharges
ST 4509	Cooling Water and Steam Condensate Discharges

Note:

a There were no discharges for this point during 1997.

Table 3-2 (2 sheets)

Summary of National Pollutant Discharge System (NPDES) Constituents for 1997

Sample Parameter	1908-K Outfall (004)		N-Springs (1301-N)		300 Area TEDF (001A)	
	Avg	Max	Avg	Max	Avg	Max
Flow rate (MGD)	0.79	4.52	*	*	0.266	0.374
Temperature (°F)	*	73.0	*	59.2	79.1	93.6
pH (minimum and maximum)	6.9	7.6	7.1	7.7	6.3	9.0
Total suspended solids (μg/L)	2.3	4.0	*	*	1300	6000
Oil and grease (mg/L)	*	*	4.4	11.1	*	*
Aluminum (μg/L)	*	*	*	*	14.5	53.0
Arsenic (μg/L)	*	*	*	*	<0.4	<0.4
Beryllium (μg/L)	*	*	*	*	<0.2	0.2
Cadmium (μg/L)	*	*	*	*	<0.2	<0.2
Chromium (mg/L)	*	*	0.002	0.003	*	*
Chlorine (mg/L)	0.03	0.08	*	*	*	*
Copper (μg/L)	*	*	*	*	2.6	3.8
Iron (μg/L)	*	*	0.02	0.03	12.7	54.4
Lead (μg/L)	*	*	*	*	<0.2	<0.2
Manganese (μg/L)	*	*	*	*	<0.4	0.9
Mercury (μg/L)	*	*	*	*	<0.2	<0.2
Nickel (μg/L)	*	*	*	*	<0.7	2.3
Radium (pCi/L)	*	*	*	*	<0.23	0.09
Selenium (μg/L)	*	*	*	*	<3	<3
Silver (μg/L)	*	*	*	*	<0.3	<0.3
Zinc (μg/L)	*	*	*	*	5.3	26.8
Nitrogen (as ammonia) (μg/L)	*	*	0.06	0.07	<56.1	260.0
Bis (2-ethylhexyl) phthalate (μg/L)	*	*	*	*	<4.8	20.0
Chlorodiflouromethane (μg/L)	*	*	*	*	<0.1	<0.1
Chloroform (μg/L)	*	*	*	*	<4.9	7.0
Coliform (growth/100mL)	*	*	*	*	<3.70	<3.70
Cyanide (μg/L)	*	*	*	*	<4.8	5.2
Dichlorobromomethane (μg/L)	*	*	*	*	<2.2	<2.2

Table 3-2 (2 sheets)

Summary of National Pollutant Discharge System (NPDES) Constituents for 1997[a]

Sample Parameter	1908-K Outfall (004)		N-Springs (1301-N)		300 Area TEDF (001A)	
	Avg	Max	Avg	Max	Avg	Max
1,1-Dichloroethane (μg/L)	*	*	*	*	<4.7	<4.7
Methylene chloride (μg/L)	*	*	*	*	<3	<3
Nitrite (NO_2) (μg/L)	*	*	*	*	<69.3	216.0
Tetrachloroethylene (μg/L)	*	*	*	*	<5	<5
1,1,1-Trichloroethane (μg/L)	*	*	*	*	<5.0	<5.0
Trichloroethylene (μg/L)	*	*	*	*	<1.9	<1.9
Toluene (μg/L)	*	*	*	*	<6.0	<6.0

Note:
a MGD = million gallons per day; * = analysis not required.

Table 3-3 (3 sheets)

1997 Radionuclide Liquid Effluent Data for Individual Effluent Streams Discharged to the Environment from FDH and BHI Facilities

Liquid effluent stream[a] [contractor] (stream code, EDP code)	Discharge disposal site	Total flow (L)	Radionuclide	Average concentration (μCi/mL)[b]	Annual release (Ci)[b]
100 Area Discharges to the Columbia River					
N-Springs [BHI] (N/A, Y101)	Columbia River	2.2 E+07	^{3}H ^{90}Sr	5.9 E-06 6.0 E-06	1.3 E-01 1.3 E-01
NPDES Outfall 004, 100-K 1908-K Outfall [FDH] (N/A, Y130)	Columbia River	1.0 E+09	^{3}H ^{60}Co ^{90}Sr ^{106}Ru ^{125}Sb ^{134}Cs ^{137}Cs ^{154}Eu ^{155}Eu ^{238}Pu $^{239/240}$Pu ^{241}Am total alpha total beta	ND ND 2.3 E-09 ND ND ND ND ND ND ND ND 5.6 E-13 7.4 E-11 3.9 E-10	ND ND 2.4 E-03 ND ND ND ND ND ND ND ND 5.9 E-07 7.8 E-05 4.1 E-04
200 Area Discharges to the Ground					
242-A Evaporator Cooling Water [FDH] (ACW, H108)	216-B-3 Pond	7.0 E+08	^{3}H ^{90}Sr ^{106}Ru ^{113}Sn ^{125}Sb ^{134}Cs ^{137}Cs ^{234}U ^{235}U ^{238}U ^{238}Pu $^{239/240}$Pu ^{241}Am total alpha total beta	8.8 E-08 ND ND ND ND ND ND 3.3 E-10 2.7 E-11 2.4 E-10 7.5 E-11 8.1 E-11 1.7 E-10 2.5 E-10 8.7 E-10	6.2 E-02 ND ND ND ND ND ND 2.3 E-04 1.9 E-05 1.7 E-04 5.3 E-05 5.7 E-05 1.2 E-04 1.8 E-04 6.1 E-04

Table 3-3 (3 sheets)

1997 Radionuclide Liquid Effluent Data for Individual Effluent Streams Discharged to the Environment from FDH and BHI Facilities

Liquid effluent stream[a] [contractor] (stream code, EDP code)	Discharge disposal site	Total flow (L)	Radionuclide	Average concentration (μCi/mL)[b]	Annual release (Ci)[b]
242-A Evaporator Steam Condensate [FDH] (ASC, H110)	216-B-3 Pond	3.2 E+06	^{3}H	ND	ND
			^{90}Sr	4.9 E-10	8.6 E-06
			^{106}Ru	ND	ND
			^{113}Sn	ND	ND
			^{125}Sb	ND	ND
			^{134}Cs	ND	ND
			^{137}Cs	ND	ND
			^{238}Pu	ND	ND
			$^{239/240}Pu$	4.7 E-11	1.5 E-07
			^{241}Am	1.5 E-10	4.8 E-07
			total alpha	ND	ND
			total beta	1.8 E-09	5.9 E-06
241-A Tank Farm Cooling Water [FDH] (CA8, H115)	216-B-3 Pond	5.4 E+08	^{90}Sr	2.0 E-10	1.1 E-04
			^{106}Ru	ND	ND
			^{113}Sn	ND	ND
			^{125}Sb	ND	ND
			^{134}Cs	ND	ND
			^{137}Cs	ND	ND
			^{238}Pu	2.3 E-11	1.3 E-05
			$^{239/240}Pu$	1.8 E-11	9.7 E-06
			^{241}Am	1.1 E-10	5.9 E-05
			total alpha	3.7 E-10	2.0 E-04
			total beta	2.7 E-10	1.5 E-04
244-AR Vault Cooling Water [FDH] (CAR, H116)	216-B-3 Pond	2.0 E+06	^{90}Sr	9.6 E-10	1.2 E-06
			^{106}Ru	ND	ND
			^{113}Sn	ND	ND
			^{125}Sb	ND	ND
			^{134}Cs	ND	ND
			^{137}Cs	ND	ND
			^{238}Pu	2.0 E-11	2.5 E-08
			$^{239/240}Pu$	2.0 E-11	2.5 E-08
			^{241}Am	1.1 E-10	1.3 E-07
			total alpha	ND	ND
			total beta	2.4 E-09	3.0 E-06
B-Plant Cooling Water [FDH] (CBC, H117)	216-B-3 Pond	1.4 E+07	^{90}Sr	ND	ND
			^{106}Ru	ND	ND
			^{113}Sn	ND	ND
			^{125}Sb	ND	ND
			^{134}Cs	ND	ND
			^{137}Cs	3.5 E-10	5.0 E-06
			total alpha	5.1 E-11	7.3 E-07
			total beta	4.1 E-09	5.8 E-05

Table 3-3 (3 sheets)

1997 Radionuclide Liquid Effluent Data for Individual Effluent Streams Discharged to the Environment from FDH and BHI Facilities.

Liquid effluent stream[a] [contractor] (stream code, EDP code)	Discharge disposal site	Total flow (L)	Radionuclide	Average concentration (μCi/mL)[b]	Annual release (Ci)[b]
200 Area Effluent Treatment Facility [FDH] (ETF, H129)	616-A Crib (SALDS)	5.5 E+07	^{3}H	4.5 E-04	2.5 E+01
			^{14}C	4.0 E-10	2.2 E-05
			^{90}Sr	5.1 E-10	2.8 E-05
			^{99}Tc	7.6 E-10	4.2 E-05
			^{129}I	2.4 E-09	1.3 E-04
			^{137}Cs	ND	ND
			^{226}Ra	9.9 E-10	5.5 E-05
			^{237}Np	3.3 E-11	1.8 E-06
			^{238}Pu	1.5 E-10	8.1 E-06
			$^{239/240}Pu$	5.0 E-11	2.8 E-06
			^{241}Am	1.3 E-10	7.0 E-06
			total alpha	1.2 E-10	6.8 E-06
			total beta	7.3 E-10	4.1 E-05

Notes:

a FDH = Fluor Daniel Hanford, Inc.; BHI = Bechtel Hanford, Inc; EDP Code = Electronic Data Processing Code.

b 1 μCi/mL = 3.7 E+10 Bq/m^3; 1 curie = 3.7 E+10 becquerel; ND = none detected.

Table 3-4

(4 sheets)

Summary of the 1997 Discharge Monitoring Reports for State Permitted Discharge Points[a]

Sample parameter	200 Area Effluent Treatment Facility (ST 4500)		400 Area Secondary Cooling Water (ST 4501)		200 Area TEDF (ST 4502)		183-N Backwash Discharge Pond (ST 4503)		100-N Sewage Lagoon (ST 4507)	
	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
Effluent flow rate (gal/month)	1.27 E+06	3.25 E+06	*	*	*	*	*	*	*	*
Effluent flow rate (gal/day)	*	*	*	*	*	*	6,180	92,580	2,000	7,668
Effluent flow rate (gal/min)	*	*	25.4	158.0	448	2,294	*	*	*	*
Influent flow rate (gal/day)	*	*	*	*	*	*	*	*	8,395	10,733
pH (minimum and maximum)	*	*	8.16	8.70	6.20	9.71	6.33	6.69	7.1	7.7
Conductivity (μmhos/cm)	NQ	NQ	*	*	171	231	*	*	*	*
Total suspended solids (μg/L)	NQ	NQ	*	*	1200	11000	*	*	31,000	48,000
Total dissolved solids (μg/L)	NQ	NQ	480,571	548,000	82,558	105,750	*	*	252,000	310,000
Biochemical oxygen demand (mg/L)	*	*	*	*	*	*	*	*	32	107
Total organic carbon (μg/L)	NQ	NQ	*	*	*	*	*	*	*	*
Total organic halides (μg/L)	*	*	59.3	146.0	*	*	*	*	*	*
Total trihalomethanes (μCi/L)	*	*	*	*	NQ	NQ	*	*	*	*
Oil and grease (mg/L)	*	*	*	*	NQ	NQ	*	*	*	*
Arsenic (μg/L)	NQ	NQ	NQ	NQ	NQ	NQ	*	*	*	*
Beryllium (μg/L)	NQ	NQ	*	*	*	*	*	*	*	*
Cadmium (μg/L)	NQ	NQ	NQ	NQ	NQ	NQ	*	*	*	*

Table 3-4

(4 sheets)

Summary of the 1997 Discharge Monitoring Reports for State Permitted Discharge Points[a]

Sample parameter	200 Area Effluent Treatment Facility (ST 4500)		400 Area Secondary Cooling Water (ST 4501)		200 Area TEDF (ST 4502)		183-N Backwash Discharge Pond (ST 4503)		100-N Sewage Lagoon (ST 4507)	
	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
Chlorine (mg/L)	*	*	*	*	*	*	0.37	0.60	*	*
Chromium (mg/L)	NQ	NQ	*	*	NQ	NQ	*	*	*	*
Cobalt (μg/L)	*	*	*	*	*	*	*	*	*	*
Copper (μg/L)	NQ	NQ	*	*	*	*	*	*	*	*
Iron (μg/L)	*	*	*	*	109	480	*	*	*	*
Lead (μg/L)	NQ	NQ	NQ	NQ	NQ	NQ	*	*	*	*
Manganese (μg/L)	*	*	NQ	NQ	<21	21	*	*	*	*
Mercury (μg/L)	*	*	*	*	NQ	NQ	*	*	*	*
Nitrogen (μg/L)	NQ	NQ	*	*	*	*	*	*	*	*
Acetophenone (μg/L)	NQ	NQ	*	*	*	*	*	*	*	*
Ammonia (μg/L)	<64	64	*	*	*	*	*	*	*	*
Benzene (μg/L)	NQ	NQ	*	*	*	*	*	*	*	*
Bis (2-ethylhexyl) phthalate (μg/L)	*	*	*	*	NQ	NQ	*	*	*	*
Carbon tetrachloride (μg/L)	NQ	NQ	*	*	NQ	NQ	*	*	*	*
Chloride (μg/L)	NQ	NQ	22,307	29,000	8,746	40,300	*	*	*	*
Chloroform (μg/L)	NQ	NQ	*	*	<2.5	4.0	*	*	*	*
Cyanide (μg/L)	*	*	NQ	NQ	NQ	NQ	*	*	*	*

Table 3-4

(4 sheets)

Summary of the 1997 Discharge Monitoring Reports for State Permitted Discharge Points[a]

Sample parameter	200 Area Effluent Treatment Facility (ST 4500)		400 Area Secondary Cooling Water (ST 4501)		200 Area TEDF (ST 4502)		183-N Backwash Discharge Pond (ST 4503)		100-N Sewage Lagoon (ST 4507)	
	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
Methylene chloride (μg/L)	NQ	NQ	*	*	NQ	NQ	*	*	*	*
Nitrate (NO_3) (μg/L)	NQ	NQ	NQ	NQ	201	566	*	*	*	*
Nitrite (NO_2) (μg/L)	NQ	NQ	NQ	NQ	*	*	*	*	*	*
N-Nitrosodiumethylamine (μg/L)	NQ	NQ	*	*	*	*	*	*	*	*
Phenol (μg/L)	*	*	*	*	NQ	NQ	*	*	*	*
Phosphorus (μg/L)	*	*	725	962	*	*	*	*	*	*
Sulfate (μg/L)	NQ	NQ	*	*	13,850	25,485	33,000	33,700	*	*
Tetrachloroethylene (μg/L)	<2.4	6.0	*	*	*	*	*	*	*	*
1,1,1-Trichloroethane (μg/L)	*	*	*	*	NQ	NQ	*	*	*	*
1,1,2-Trichloroethane (μg/L)	NQ	NQ	*	*	*	*	*	*	*	*
Tetrahydrofuran (μg/L)	NQ	NQ	*	*	*	*	*	*	*	*
Trihalomethanes (mg/L)	*	*	*	*	NQ	NQ	65.63	98.30	*	*
WTPH-G (μg/L)	*	*	*	*	NQ	NQ	*	*	*	*
Total alpha (pCi/L)	NQ	NQ	*	*	NQ	NQ	*	*	*	*
Total beta (pCi/L)	NQ	NQ	17.6	23.6	<1.3	1.3	*	*	*	*
Ra-226 (pCi/L)	*	*	*	*	<1.0	1.0	*	*	*	*
Ra-226 & Ra-228 (pCi/L)	*	*	*	*	NQ	NQ	*	*	*	*

Table 3-4

(4 sheets)

Summary of the 1997 Discharge Monitoring Reports for State Permitted Discharge Points[a]

Sample parameter	200 Area Effluent Treatment Facility (ST 4500)		400 Area Secondary Cooling Water (ST 4501)		200 Area TEDF (ST 4502)		183-N Backwash Discharge Pond (ST 4503)		100-N Sewage Lagoon (ST 4507)	
	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
Sr-90 (pCi/L)	NQ	NQ	*	*	*	*	*	*	*	*
Tc-99 (pCi/L)	<3.6	3.6	*	*	*	*	*	*	*	*
Tritium (pCi/L)	*	*	6,524	16,600	*	*	*	*	*	*
Tritium (Ci/month)	<4.4	10.2	*	*	*	*	*	*	*	*
Total uranium	NQ	NQ	*	*	*	*	*	*	*	*

Note:
a * = analysis not required; NQ = non-quantifiable (i.e. below practical quantification limits (PQL)).

Table 3-5

Sanitary Sewage Discharged to the Soil in 1997

Area	Population	Discharge[a] (L/yr)	Discharge[a] (gal/yr)
100-D	9	2.1 E+05	5.6 E+04
100-H	0	0.0	0.0
100-K	311	7.4 E+06	2.0 E+06
100-N	408	9.7 E+06	2.6 E+06
200 East	2,068	4.9 E+07	1.3 E+07
200 West	1,547	3.9 E+07	9.7 E+06
300[b]	1,819	0.0	0.0
400[c]	415	2.8 E+06	7.5 E+05

Notes:

a Discharges estimated by multiplying the total number of persons assigned to each area by 95 L/day-person (25 gal/day-person) and by 251 business days.

b Discharges from the 300 Area no longer go to the soil column.

c Discharges from the 400 Area were discontinued on April 15, 1998.

4.0 HAZARDOUS SUBSTANCE RELEASES

A hazardous substance released to the environment is required to be evaluated to determine if it is reportable to the appropriate federal, state, and local regulatory agency(s). If the quantity released meets or exceeds the reporting thresholds, the notification is required. Reportable releases of hazardous substances are classified as the following two types:

- Nonroutine releases
- Continuous, routine releases.

Information for each type of release is discussed in the following sections.

4.1 NONROUTINE RELEASES

The following listing shows the number of non-routine releases of a solid, semi-solid, liquid, or airborne substance involving radioactive, hazardous, or dangerous wastes, hazardous or extremely hazardous substances, polychlorinated biphenyls (PCBs), and oil and/or petroleum derivatives for 1997.

Fluor Daniel Hanford

- 7 releases were evaluated and determined to be reportable and 242 other releases were evaluated and determined to be nonreportable per regulatory notification requirements for FDH and its subcontractors

Bechtel Hanford, Incorporated

- 0 releases were evaluated and determined to be reportable and 79 other releases were evaluated and determined to be nonreportable per regulatory notification requirements for BHI and its subcontractors

4.2 ROUTINE CONTINUOUS RELEASES

Releases of hazardous substances that exceed CERCLA reportable quantities (RQ) need not be reported immediately to the National Response Center when both of the following conditions are met:

- An initial notification has been completed
- The routine releases are continuous and stable in quantity and rate.

The initial notification requirement has been satisfied concerning hazardous substances that have exceeded or have a potential to exceed an RQ. Historically only the continuous routine releases of ammonia, ammonium hydroxide, and carbon tetrachloride have posed operational difficulties in staying beneath RQs. For 1997, releases of ammonia, ammonium hydroxide, and carbon tetrachloride were below reportable quantities and were continuous and stable in quantity and rate.

5.0 REFERENCES

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